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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/687,715
Filing Date: October 17, 2003
Appellant(s): CHEN, MEI

Edouard Garcia
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4/23/2008 appealing from the Office action mailed 1/23/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,380,986 B1	Minami et al.	4-2002
6,724,915 B1	Toklu et al.	4-2004
US 2001/0019621 A1	Hanna et al.	4-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-7, 9 and 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. (hereinafter "Minami"; US 6,380,986 B1) in view of Toklu et al. (hereinafter "Toklu"; US 6,724,915 B1).

Regarding **Claim 1**, Minami discloses a method for estimating a displacement of an object appearing in a first image and a second image, comprising:

ascertaining a respective candidate location of the object in each of a plurality of search regions in the second image **(column 3, lines 17-44)**; and

for each of the search regions, determining a respective candidate displacement vector relating the respective candidate location of the object and a location of the object in the first image **(Fig. 1, Narrow Area Search Section for Computing Displacement Vector 120; column 12, lines 25-41, i.e. motion vector (candidate displacement vector) is determined for each search area (candidate location) "a plurality of narrow areas are successively searched" (column 12, lines 31-32); "A search area is selected by shifting the center of**

search area of the chosen template from the location of the zero motion vector (0,0) to a given location (step S41)" (column 12, lines 36-39));.

Minami does not explicitly teach associating a respective confidence value with each of the candidate displacement vectors.

Toklu, working in a related problem solving area of motion estimation through image analysis, teaches:

associating a respective confidence value with each of the candidate displacement vectors **(column 10, lines 22-39, i.e. a template is used to estimate an object location (column 4, lines 55-56) and the location relative to an initial location defines the "candidate displacement vector" (column 4, lines 36-41 i.e. trajectory); each candidate displacement vector is assigned a respective "confidence value" (column 10, lines 22 to 24, i.e. each sub-template (candidate displacement vector) is assigned a correlation value (column 9, lines 32-67) or MSE value (column 10, lines 10-21) and Toklu teaches the correlation value or MSE value is a measure of confidence (i.e. confidence value (column 10, lines 34-39))))**.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have associated Toklu's confidence value for a candidate location with Minami's candidate displacement vectors in order to enhance tracking performance (i.e. get a reliable result) **(Toklu: column 4, lines 23-26; column 6, lines 6-8; column 10, lines 22-24)**.

Minami in combination with Toklu discloses providing the estimated displacement of the object based at least in part on an evaluation of the confidence values **(Minami: column 13, lines 7-9)**.

Regarding **Claim 2**, Minami combined with Toklu discloses a method as defined in Claim 1 above, wherein the ascertaining comprises determining the search regions based on search parameters selected from the group that consists of search region dimensions **(Minami: column 2, lines 5-14)**, motion model trajectory **(Minami: column 3, lines 52-63)**, search range and step size **(Minami: column 6, lines 18-23)**.

Regarding **Claim 3**, Minami combined with Toklu discloses a method as defined in Claim 2 above, wherein determining the search regions comprises: determining a range of displacement of the object between the first image and the second image **(Minami: column 7, lines 32-38, i.e. reference vector)**; selecting step size for traversing the range within the second image **(Minami: column 5, lines 32-34 and column 6, lines 21-23)**; and determining the plurality of search regions within the second image based upon the selected step size and the selected range of displacement **(Minami: column 3, lines 17-21 and 52-59)**.

Regarding **Claim 4**, Minami combined with Toklu teaches a method as defined in claim 2 further comprising:

evaluating each of the confidence values with respect to a cutoff condition **(Minami: column 9, lines 56-62, i.e. utilizing sums of squares of the**

differences to determine a confidence value as suggested by Toklu in claim 1 above);

in response to a determination that none of confidence values satisfies the cutoff condition, selecting at least one new search parameter and repeating the ascertaining, the determining of the respective candidate displacement vectors, and the associating based on the selected new search **(Minami: column 19, lines 12-19)**.

Regarding **Claim 5**, Minami combined with Toklu discloses a method as defined in claim 1 above, wherein the ascertaining comprises determining the search regions such that adjacent ones of the search regions overlap one another **(Minami: Fig. 9)**.

Regarding **Claim 6**, Minami combined with Toklu discloses a method as defined in claim 1 above, wherein the ascertaining comprises determining the search regions such that the search regions lie along a path across the second image **(Minami: column 3, lines 52-63)**.

Regarding **Claim 7**, Minami combined with Toklu discloses a method as defined in claim 1 above, wherein the ascertaining comprises determining the search regions based on a selected step size **(Minami: column 6, lines 18-23)**.

Regarding **Claim 9**, Minami combined with Toklu discloses a method as defined in claim 1 above, wherein the ascertaining comprises performing a multiresolution analysis to determine the respective candidate object locations **(Minami: column 2, lines 42-47)**.

Regarding **Claim 11**, Minami combined with Toklu teaches a method as defined in claim 1, wherein the associating comprises for each of the candidate displacement vectors performing an image reconstruction and correlation analysis based on the candidate displacement **(Toklu: column 9 line 35 to column 10 line 9)**.

Regarding **Claim 12**, Minami combined with Toklu teaches a method as defined in claim 1.

Minami combined with Toklu does not disclose the limitation wherein the associating comprises for each of the candidate displacement vectors performing a residual error analysis based on the candidate displacement vector to determine the associated confidence value.

However, performing a residual error analysis was well known in the art at the time of the invention.

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have accomplished the associating by performing a residual error analysis.

Regarding **claims 13 and 17**, since method, system and apparatus are analogous, the system of claim 13 and apparatus of claim 17 are anticipated by Minami in combination with Toklu as discussed in the method of claim 1 above.

Regarding **Claim 14**, Minami combined with Toklu discloses a system as defined in claim 13, further comprising a search region generator operable to determine the

search regions based on search parameters comprising search range and step size **(Minami: column 6, lines 18-23)**.

Regarding **Claim 15**, Minami combined with Toklu discloses a system as defined in claim 13 above, wherein the validity comparator is operable to evaluate each of the confidence values with respect to a cutoff condition **(Minami: column 9, lines 56-62, i.e. utilizing sums of squares of the differences to determine a confidence value as suggested by Toklu in claim 1 above)**.

Regarding **Claim 16**, Minami combined with Toklu discloses a system as defined in claim 15 above, further comprising a search region generator, wherein in response to a determination that none of the confidence values satisfies the cutoff condition:

The search region generator is operable to select at least one new search parameter and determine new search regions in the second image based on the selected new search parameter **(Minami: Fig.8, S44)**;

The object displacement estimator is operable to ascertain a respective new candidate location of the object in each of the new search regions **(Minami: Fig.8, S41)**, and for each of the new search regions, determine a respective new candidate displacement vector relating the respective new candidate location of the object and a location of the object in the first image **(Minami: Fig.8, S42)**;

and the validity measurer operable to associate a respective new confidence value with each of the new candidate displacement vectors **(Minami: column 9, lines**

56-62, i.e. utilizing sums of squares of the differences to determine a confidence value as suggested by Toklu in claim 1 above).

Regarding **claims 18-20**, Minami combined with Toklu discloses a method and analogous system and apparatus as defined in claim 1, wherein the providing comprises selecting the candidate displacement vector associated with a highest one of the confidence values as the estimated displacement of the object **(Toklu: column 10, lines 24-39)**.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minami in view of Toklu as applied to claim 1 above, and further in view of Hanna et al. (Hereinafter "Hanna"; US Patent Application 2001/0019621).

Regarding **Claim 10**, Minami combined with Toklu teaches a method as defined in claim 1.

Minami combined with Toklu does not teach the limitation wherein the ascertaining comprises performing an optical flow analysis to determine the respective locations of the object in the search regions.

However, Hanna teaches an object displacement estimate comprising an optical flow analysis **(page 5, ¶52 lines 10-13)**.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have modified the Minami-Toklu method of claim 1 with Hanna's teaching above. The motivation to combine being that Hanna's

modification serves as a predictor of depth in the first and second images **(page 5, ¶52 lines 12-15)**.

(10) Response to Argument

Applicant's arguments filed 4/23/2008 have been fully considered but they are not persuasive.

In response to applicant's argument that the Toklu reference does not teach "associating a respective confidence value with each of the candidate displacement vectors" (Appeal Brief: page 7, lines 5-9), the examiner notes that Toklu does teach such an "associating" element **(column 10, lines 22-39, i.e. a template is used to estimate an object location (column 4, lines 55-56) and the location relative to an initial location defines the "candidate displacement vector" (column 4, lines 36-41 i.e. trajectory); each candidate displacement vector is assigned a respective "confidence value" (column 10, lines 22 to 24, i.e. each sub-template (candidate displacement vector) is assigned a correlation value (column 9, lines 32-67) or MSE value (column 10, lines 10-21) and Toklu teaches the correlation value or MSE value is a measure of confidence (i.e. confidence value (column 10, lines 34-39))))**. **Toklu further discloses an associating element in Fig. 1, Step 130 and Step 150, i.e. first prediction of location and first respective associated confidence value (Step 130) and second prediction of location (Step 150) (i.e. clearly there are multiple**

locations (first and second) and updating the confidence value (i.e. associating the confidence value with the second location)).

In response to applicant's argument that Minami does not disclose the "determining" element of claim 1 (Appeal Brief: page 8, lines 1-2) examiner notes that Minami does disclose such a "determining" element **(Fig. 1, Narrow Area Search Section for Computing Displacement Vector 120; column 12, lines 25-41, i.e. motion vector (candidate displacement vector) is determined for each search area (candidate location) "a plurality of narrow areas are successively searched" (column 12, lines 31-32); "A search area is selected by shifting the center of search area of the chosen template from the location of the zero motion vector (0,0) to a given location (step S41)" (column 12, lines 36-39))**.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, appellant's argument in regards to motivation to combine (page 9, lines 4-7) is pertinent only to the final stage of Minami's teaching. However the combination of Toklu's "confidence value" is relevant to the intermediate stages, i.e. in order to enhance Minami's search of

a plurality of candidate locations (i.e. get a reliable result) **(Toklu: column 4, lines 23-26; column 6, lines 6-8; column 10, lines 22-24)**.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Clifton Daley/

6/20/2008

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